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NAVAL APPROPRIATION BILL, 1922

SUPPLEMENT TO HEARINGS

BEFORE

U.S. Congress.

SUBCOMMITTEE OF HOUSE COMMITTEE ON APPROPRIATIONS

CONSISTING OF

MESSRS. PATRICK H. KELLEY (CHAIRMAN), BURTON L. FRENCH, WILLIAM R. WOOD, WILLIAM A. AYRES, AND JAMES F. BYRNES

IN CHARGE OF

NAVAL APPROPRIATION BILL FOR 1922

SIXTY-SIXTH CONGRESS
THIRD SESSION

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SIXTY-SIXTH CONGRESS, THIRD SESSION.

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SUPPLEMENT NAVAL APPROPRIATION BILL, 1922.

TUESDAY, FEBRUARY 1, 1921.

AVIATION.

STATEMENT OF BRIG. GEN. WILLIAM MITCHELL, ASSISTANT CHIEF OF THE AIR SERVICE, UNITED STATES ARMY.

Mr. KELLEY. We have with us this afternoon Gen. Mitchell, of the Army Air Service. This is a question in which the American people and the whole world are greatly interested—the development of activities in the air—and the General has been kind enough to come to give us the benefit of any experience he may have had and anything he has worked out along this line. I think, perhaps, the best would be to have you proceed in your own way, General, and then later on we can ask such questions as may occur to us. Perhaps you would rather do that than be interrupted as you go along.

GENERAL STATEMENT.

Gen. MITCHELL. We appreciate very much being called before your committee. We have had some experience in the development of aviation and with your permission will trace the development of aviation from the time it began in the European war, which was virtually the actual beginning of military aviation. Every fact we give you we can substantiate, either by actual experiences in war or by tests which we have carried out since, and as we proceed we would appreciate very much if you would ask questions at any time.

I have data here which, I think, will explain most of the statements I will make. At the beginning of the European war—which, of course, was a contest between the allied powers on the one side and the Germans on the other—primary consideration was given to armies and to navies. The mission of the armies was to destroy the military power of their enemies, and the mission of the navies was to keep the sea communications open for the countries employing navies. Although a good deal of consideration had been given to air matters, the air was such a new thing that it had not proved its utility in any effective way. There were no airplanes in the Russo-Japanese War or in our Civil War, so that there were no precedents to go on. Consequently the nations hesitated to put much money into or time on those things as compared to other means of warfare that they knew more about. So that aviation began with very low-powered airplanes with no armament on them, and they

were used entirely for reconnoissance purposes. In the spring of 1915 the utility of reconnoissance by airplanes had been proved so strongly that no army could move without the air of airplanes in reconnoissance, nor could it carry out an attack, nor could it prepare for future attack. Consequentlv it was necessary for an opponent to get these airplanes out of the air. If one side could get the opposing airplanes out of the air, it gave it such an advantage that it would be able to surprise the enemy at will; it would be able to maneuver all around an enemy without being discovered, and thereby gain an advantage which would be invaluable.

Taking that into consideration, the Germans were the first to put machine guns in their airplanes and to constitute a branch of aviation essentially designed for shooting the enemy out of the air. The minute that took place the mission of aviation changed from one purely of reconnoissance to one which involved destroying the enemy's air force, and from that time that mission grew and amplified. In other words, the air force was essentially designed from that time on for protecting the air communications in very much the same way that the Navy is used for protecting sea communications.

After the development of pursuit aviation the development of airplanes made it possible to carry missiles of continually increasing weight. At the beginning of the war the airplanes threw down small darts and little grenades or small shells, which had been adapted from cannon shells, etc. In fact, in August and September, 1914 the Germans flew over Paris at a very low altitude and dropped these things. Of course, they had very little effect, because they were so small; but as the possibility of carrying weights in airplanes increased, and as the effect of high explosives became better known more time was given to it, so that by the end of the war we had already dropped weights from airplanes of upward of a ton.

Beginning with 1917 a definite organization of bombardment aviation was adopted. It was used principally against the enemy's communications; that is, if you could destroy his communication and prevent his reserves from coming up to the line, you practically had the battle won, because the question of gaining a decision on the western front was not so much a question of whipping the troops in the front line as it was a question of whipping their reserves. So an airplane was developed for that purpose using explosive projectiles. The third kind of offensive aviation that came into use during the war was that designed to attack troops on the ground. It is difficult to attack troops on the ground, because they hide themselves. They get into holes in the ground; they get behind trees, and all sorts of places; but if you can catch columns on the road, particularly the mortar or truck columns, a great deal of destruction is possible, even with the weapons we had at that time, which, of course were only in their beginning. So we gradually got a third branch of aviation, which we denominated attack aviation. The Germans again took the lead in that, and at the end of the war had armored airplanes on the front ready to go over, and a few had been sent over experimentally. From the outset we had to develop offensive aviation to meet those attacks, and at the end of the war our offensive air force represented about 80 per cent of the total amount of aviation, 20 per cent being for observation, and of that offensive for

from 60 to 70 per cent consisted of pursuit aviation—that is, aviation that goes out and fights for control of the air—the remainder being about equally divided between bombardment aviation and attack aviation.

With the end of the war it became necessary, more than ever, to consider the application of air power as distinguished from land power and sea power. Of course, to end up with, war is always a contest of man to man, and anything that has to be kept outside of that is really an auxiliary, because, as I say, the thing that decides a war in the end is the infantry. But the problems entirely changed with the coming of these large explosive charges which could be carried in the air, together with the fact that no means of defense from the ground alone suffices; and in that connection I might say that we lost about one-tenth of 1 per cent of our aeroplanes over the line from antiaircraft fire. Speaking of attacks from the ground, take an attack on a captive balloon. A captive balloon is so placed that all the antiaircraft artillery cross their fire over it and it is surrounded by antiaircraft machine guns. I have had as high as 30 machine guns assigned to one balloon, and that was especially true in the operations at Chateau-Thierry, where the Germans for awhile had a decided superiority. All the antiaircraft defense that was possible from the ground never prevented a hostile air force from attacking if they had sufficient control of the air; in fact, we had one balloon shot down by German aeroplanes as often as five times in one day. There was one thing definitely proved, and that was that we had comparatively little to fear from any fire from the ground.

In considering this thing as an element of national defense we are immediately struck by the fact that the air is the air, no matter where it is; whether it be over the water or over the land, it is just the same thing, in so far as the radius of action we have is concerned, because, after all, that radius of action is dependent on the amount of gas we have in our aeroplane's tank. Coast lines, rivers, mountains, and anything else are no obstacles; we go right over them, the only difference being in the temperature of the air.

Take pursuit aviation. The rules for fighting in the air have been pretty well settled, and fighting in the air has principles of its own, just the same as fighting on land; that is, if your enemy has a trained organization and the equipment which can conform to what we know is the best thing for fighting in the air, and you have not, he is going to get you every time; you can not beat it. Now, the organization for fighting in the air is a group of 100 aeroplanes, of four squadrons, and each squadron is arranged in three flights, and each flight has the number of aeroplanes that one man can handle through his own personal leadership. The aeroplanes operate in three dimensions, and the basis of the grouping is that one squadron attacks on the same level, another from underneath, and another from up above—a fourth being in reserve. As I say, we can attack in three dimensions and bring a reverse fire against anything else that is in the air. Of course, reverse fire is the most serious, and that is true in the air as well as on the land or water. It is said that 1 gun behind is equal to 10 in front.

Therefore, our whole system of maneuvering in the air is to get behind and bring a reverse fire. The Germans developed a system

whereby they flew their airplanes in an almost truncated cone, and when we were successful in meeting that the Germans changed their system within two days. They were very flexible. In the end we all practically had the same tactics, and our tactical grouping in the air was four squadrons and we arranged them into wings of two or more groups. I favor 300 machines in a wing and we used them that way. All nations that fight in the air consider that pursuit aviation is the basis of all air work, no matter where it is, whether over land or water, just the same as the infantry is the basis of the army.

Having obtained control of the air, the next thing, of course, is to assist the troops, or, if it be a navy, in the execution of its mission, and wherever the principal effort is being exerted there you ought to concentrate all of the air force you have available. If you do not do that, you will meet the enemy with divided forces, and, if he concentrates all of his forces, he will get you in detail; he will defeat you just as sure as anything can possibly be.

Now, as to the attack of objects on land in assisting the army. I mentioned before the matter of bombardment, and in that connection one of the principal problems is to keep the reserves out of action. If we can destroy or clear, in a great measure, a concentration point so as to clog the means of communication around it, such as Paris was during the last war, we will have accomplished a great deal. Of course, the bombardment of Paris, which took place in the summer of 1918, was designed for the purpose of clogging the means of transportation around the city; it had the effect of doing that and of keeping the supplies, to a very great extent, from the front. We can do that now to a much greater extent than before. During the war our bombarding groups carried from 3 to 4 tons, whereas now they can carry upward of 100 tons, and before we had to depend on a machine of comparatively small carrying capacity so as to get the altitude necessary to protect it. Altitude is a protection against pursuit aviation. But on account of the improvements that have been developed since the war we can get the necessary altitude now with the largest machines. So we can use our largest machines and we have some designed that will carry up to about 5,000 pounds of bombs with a great radius of action. They can go as high as our small ships did before. We can also use gas missiles, and everybody is figuring on the use of gas.

Now, gas will last over a certain period of time. The Chemical Warfare people inform us that two tons of crying gas will last about eight days and cover an area of 10 by 10 miles; that 70 tons of mustard gas covering an equal area will last about eight days and 200 tons of phosgene on a 10 by 10 mile area will last for about the same time. The two last gases are very deadly as is well known. Of course, nobody used gas in Europe because the air forces were so nearly equal that if one had started it the other would have immediately started. Everybody was ready to start it, and if it had been started the losses would have been something terrific. I might say that in Europe the two air services grew up together; they were developed during the war and neither one had a very great predominance over the other until toward the end of the war, when we were beginning to get a decided predominance, and at that time we were able to shift the greater portion of our aviation from the attack of

hostile aviation to the attack of troops on the ground. That was particularly so during the Argonne operations. With our attack aviation we now carry eight machine guns and a cannon, and we can drive off of the road moving columns; we can drive off motor trucks; we can destroy railroad trains and can destroy tanks to a great extent, although by concealing them in the woods it makes it difficult to do very much with them. An air force is effective against anything that is exposed and even machine gun nests can be destroyed. I have photographs here of the ship which can carry a battery of eight machine guns and a cannon. We are constantly increasing the size of the guns and I think within a year we should be able to fire 6-inch guns. So much for aviation over the land.

AVIATION OVER LAND.

Mr. KELLEY. I take it that aviation over the land, after all, is a supplemental weapon.

Gen. MITCHELL. Yes, sir; it is always supplemental to the Army as is a Navy for that matter.

Mr. KELLEY. You can not dispose of the Army?

Gen. MITCHELL. No, sir; it can not be done. The contest is always man to man, to end up with; everything in national defense is designed for that purpose and it has got to be that.

Mr. KELLEY. You can interfere with the movements of a column?

Gen. MITCHELL. Depending upon how much control you have of the air.

Mr. KELLEY. If you have a superior force you can interfere with an enemy's movements and his base of supplies.

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. And with his reserves.

Gen. MITCHELL. Yes; and with his manufacturing centers, or anything of that sort.

Mr. KELLEY. But it does not mean that the war of the future on land will be fought in the air to the exclusion of the infantry.

Gen. MITCHELL. No, sir; not in any manner that we can see now, unless the infantry is transported through the air to the places where you wish to apply it and it is supplied by the air.

Mr. KELLEY. During the war I suppose the inventive genius of the world, so far as air development is concerned, was largely directed toward land movements.

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. That being where your great interests were?

Gen. MITCHELL. That is where the decision was called for; yes, sir.

Mr. KELLEY. So that the experience that has grown up so far is largely a land experience?

Gen. MITCHELL. Yes, sir; I might say that experience was developed around observation aviation for reconnaissance purposes and the offensive part of aviation grew up on account of the necessity of protecting it, primarily, and assisting the Army in obtaining its decision. As I will show after a while, we can conduct air operations entirely independent of an army or of a navy under certain conditions, but in Europe it grew up essentially with observation aviation as the basis for it, and gradually developed along that line.

Mr. KELLEY. Is the machine gun susceptible of being developed to any size?

Gen. MITCHELL. We now have a machine gun that is fired very satisfactorily up to 50-caliber, and we are now making a 37-mm. cannon, which is practically a machine gun. The 50-caliber gun is a terrible weapon, and with the spotlight bullet, which has phosphorus in it and bursts on impact with a great flame, it makes an explosive thing that is terrific.

Mr. KELLEY. Would that be carried on the plane?

Gen. MITCHELL. Yes, sir. We carry a 50-caliber machine gun on this ship. That is our pursuit ship, and it has a very good performance; it is just as good as any pursuit ship we have. We now have models of those ships out and we are equipping them with one 45-caliber gun and one 30-caliber gun, and we are having 50-caliber guns made with a view of installing them on that ship.

Mr. BYRNES. Where do you install the gun?

Gen. MITCHELL. Right there are the guns [indicating]. That is the most important element of any air work, no matter where it is. Nothing can compete with pursuit aviation.

Mr. KELLEY. Is there some probable limit as to the size of a machine gun which you can develop?

Gen. MITCHELL. It is merely a question of mechanical arrangement and all that sort of thing; it has been constantly increasing.

Mr. WOOD. How do you keep from hitting the propeller?

Gen. MITCHELL. You have your synchronism through cams, just as you have on your automobile; in other words, there is a cam that comes in there which so times the shot that it will not hit the propeller.

Mr. WOOD. If you hit the propeller you would be in bad shape?

Gen. MITCHELL. Yes; you are in bad shape if you happen to hit the propeller, and sometimes that has been done; but it is simply a mechanical matter; there is no trouble about that whatever. I might say that at the end of the war these ships went 135 miles an hour, while that ship is now going 170 miles an hour, and we can go up 20,000 feet with that ship in 20 minutes. So, you see how rapid the improvement has been.

Mr. KELLEY. A gun, such as you speak of, would be effective at what distance?

Gen. MITCHELL. That gun is effective, of course, at a great distance; that gun would be effective at about 7,000 yards, but we can not hit in the air, ordinarily, until we get very close; we do not fire in the air until we get within 100 yards or less. We close right up on them.

Mr. KELLEY. Suppose one of those guns were mounted on the deck of a ship, or on a stationary platform on shore, would it be any more effective in bringing down craft than those you had during the war?

Gen. MITCHELL. It would not be nearly as effective on a ship, because they can not distribute it in masses as is the case on land.

Mr. KELLEY. I was wondering whether there was some development in the way of a larger machine gun which would lessen the efficiency of aircraft as fighting machines.

Gen. MITCHELL. I do not think so, because your angle is so much greater when your airplane is low than when it is up high.

Mr. KELLEY. Then, the only way to get an airman out of the air is for another airman to do it?

Gen. MITCHELL. That is it, exactly. The most effective way to handle guns on the ground against airplanes is to arrange them in groups. We had groups of about 30; one gun would follow the airplane and when the signal was given all 30 would shoot at once; they would burst out together; then there would be another burst and then another. We had many of them concealed so that they could not be detected, and we changed them every day or two so that they would not be detected from the air. We had them as completely concealed as possible, and in that way we did get some hits.

Mr. BYRNES. Did the antiaircraft guns meet with any success?

Gen. MITCHELL. Very little. It was definitely proved that the only defense against the air is the air, and in defending against the air you must coordinate your gun defense and your searchlight defense, as well as your system of listening. Here is the whole system of night defense [indicating on map]. Here is your hostile ship, your antiaircraft defense, and here are your listening posts [indicating]. Then, you have your searchlights, and, again, we arrange the searchlights in great numbers, so that we have a certain zone entirely lit up, and when an enemy plane flies through a certain zone it is picked up, while your own planes can not be detected. A pursuit ship in the air is told what zone the enemy plane is coming into, and the antiaircraft cannon and searchlights assist it.

Mr. BYRNES. Would your searchlights disclose to a hostile ship the presence of a pursuit ship?

Gen. MITCHELL. No, sir; he will be in the dark all the time.

Mr. BYRNES. Why is that? Is it because he is flying higher?

Gen. MITCHELL. He is out of the zone; we have a certain zone marked off for each one; after he attacks we do not care whether it shows on him or not. Of course, they all know that pursuit ships are in the air. Over in Europe we had some mobile lights behind, and all of the things we were using, of course, were crude, but we have improved on them a great deal since, where we have been allowed to improve. Our offensive system to go across the line was to attack the antiaircraft defenses on the ground when necessary, and, while we were attacking them, go over in the air and bombard. That was the general system in that connection. As to the question whether fire from the ground is effective against aircraft, I will say that we do not consider it effective, but we take measures against it.

Mr. KELLEY. Even with the larger machine-gun development?

Gen. MITCHELL. Yes, sir; it is not effective against aircraft in general, and it will be less effective from the deck of a vessel, because we will know exactly where it is on the deck of a vessel and we can take measures accordingly, and we know that the very first bomb we drop on there will put that antiaircraft defense pretty well out of business; knock out all their searchlights, smash every navigating instrument they have, and make it very difficult to handle the ship.

Mr. KELLEY. I was interested in what you said about gas and I was a little surprised to hear you say that it was almost a matter of agreement that you did not use gas.

Gen. MITCHELL. Yes, sir; that was because none wanted to use gas if we could possibly get out of it; it meant the death of hundreds of women and children, and nobody wanted to use it.

Mr. KELLEY. Still we were making great quantities to be used.

Gen. MITCHELL. But that was to be used with the guns at the front; that was to be used against the fighting forces that were actually on the line.

Mr. KELLEY. If you had had sufficient superiority in the air you would not have dropped gas bombs on the army.

Gen. MITCHELL. I doubt it, because if we had dropped any gas from the air it would have been the signal for the other side to go a little bit further, and they would have gone into centers of concentration behind the Army and it would have been something awful.

Mr. KELLEY. For what purpose did you use this gas?

Gen. MITCHELL. We used it in gas shells with the artillery, I believe.

Mr. KELLEY. That is, it was used against troops?

Gen. MITCHELL. Yes, sir. I do not know how much gas made in this country was actually fired, but we used a great deal of gas that was made in this country, but that applies to projectiles that were used from cannon on the front.

Mr. WOOD. It was gas made in this country and put in foreign shells.

Gen. MITCHELL. I am not certain about that.

Mr. KELLEY. Then what weapons do you use?

Gen. MITCHELL. We have three different weapons. One would be missile-throwing weapons that can throw projectiles out from the side, front, or rear of an airplane, such as gun weapons and some forms of aerial torpedoes that we may have; the next is the explosive projectile such as a bomb, and the third is the gas projectile.

Mr. KELLEY. The point I had in mind was why, if you had superiority in the air, and your aim was to whip the army on the opposite side, you would not do it with gas?

Gen. MITCHELL. That depends on what the policy of the nation is. If an attack were made against our industrial centers in the Middle West they might be better handled by gas than anything else from aircraft. The towns in this country are very easy to destroy by explosive projectiles also, because their construction has a great deal of wood in it and they are lightly built as compared with the European cities. They would be very easy to wreck.

Mr. KELLEY. Why did not the Germans drop gas on Paris?

Gen. MITCHELL. Because if they had we would have smothered them with gas on their side, and the cities along the Rhine, their hives of industry, would have gotten the mischief; we surely would have smothered them with gas.

Mr. FRENCH. I want to say, outside of the dropping of gas on cities containing innocent women and children, that my notion, from an analysis of the results of the war, is that gas produces greater results than anything else. It put more men out of commission than anything else, those who actually died or failed to become normal men again.

Gen. MITCHELL. Yes; it is an awful thing. It is not appreciated by the people here to the extent it is by the troops who were on the line. Of course, there are defenses against it, but it is being improved constantly. The following statement by Mr. Bradner, chief of research of the Chemical Warfare Service, is very interesting:

STATEMENT OF D. B. BRADNER, CHIEF CHEMICAL RESEARCH AND DEVELOPMENT DIVISION, CHEMICAL WARFARE SERVICE.

Mr. BRADNER. Mr. Chairman, the Chemical Warfare Service has discovered a liquid approximately three drops of which, when applied to any part of the skin, will cause a man's death. Much smaller amounts than this, or even vapors from the liquid, cause very severe slow-healing burns.

The experience of the World War proved it is possible for an airplane to fly within 100 feet of enemy troops and machine-gun them with practical impunity. The opinion of men well informed on aerial warfare is that the only defense against airplanes is attack by airplanes.

If, instead of carrying machine guns, attacking planes were equipped to carry a tank of this liquid for discharge from nozzles similar to the ordinary street sprinkler, so that it would fall like rain, killing everything in its path, then you would have a weapon which would absolutely destroy troops, noncombatants, or cities, unless they were protected by a superior air navy.

One plane carrying 2 tons of the liquid could cover an area 100 feet wide by 7 miles long in one trip and could deposit enough material to kill every man in that area by action on his skin. If the men were not protected by gas masks, which would be the case if the attack were made on a city, the fatal area would be several times as great.

It is well to mentain here that it is not only possible, but highly probable, that an enemy, if he had control of the air and so was free from the fear of retaliation, would threaten to use this weapon to compel the evacuation of cities, munition works, etc, and, if such evacuation did not take place, the position would undoubtedly be attacked.

The only limit to the quantity of this liquid which could be made is the amount of available electric power, as nearly every nation has practically an unlimited supply of the necessary raw materials. It would be entirely possible for this country to manufacture several thousand tons per day, provided the necessary plants had been built.

There is a possibility that a protective clothing can be developed which will entirely cover the wearer and be impervious to this liquid, still allowing water vapor to pass through. Work along this line is being pushed by this service, but the problem is an extremely difficult one and it is probable that several years will be required to develop such a material, if it is possible to do so at all.

It is probable that cities can be protected by chemical means, but this, also, will require time for development.

The most logical defense is an air force more powerful than that possessed by any other power. At the present time, if our country were attacked by an enemy with a superior air force, our entire Army would be annihiliated, for it could do nothing whatever to defend itself.

During the Argonne offensive in the past war the entire first American Army of a million and a quarter men occupied an area approximately 40 kilometers long by 20 kilometers wide. If Germany had had 4,000 tons of this material and 300 or 400 planes equipped in this way for its distribution, the entire first army would have been annihilated in 10 to 12 hours.

In closing, it is desired to emphasize the importance of scientific research, as compared with a large army, as the more effective and less expensive means of protecting our country. The Chemical Warfare Service this year is asking for less than 1 per cent of the total Army appropriation. During the past war gas produced over 30 per cent of our casualties; in the future, the percentage will be far higher. New methods of defense will be devised to meet this particular new development; but if scientific research on military problems is not continued on an efficient basis, another development will be made and an enemy will use it against us before we have worked out a defense.

Mr. FRENCH. Of course, as soon as we were able to meet gas attacks the losses became smaller, but we were horrified when we learned that anyone was using it. As I understand, the deaths amounted to between 30 and 40 per cent at first, but later it was between 1 and 2 per cent, but thousands were put out of commission.

Gen. MITCHELL. Yes, sir; you have to protect yourself against gas and you must have the best protection, because they are all get-

ting new gases that will go through the old protection. They now have gases against which our gas masks will not protect us at all.

Mr. FRENCH. It may be that no arrangement could be agreed upon by which cities, with their population of women and children, could be protected if gas were utilized, but it seems to me that there are other means of warfare that should be discontinued, as well as gas, from the standpoint of humanity.

Gen. MITCHELL. Yes, sir. Of course, some nations hold that every man, woman, and child becomes a part of the fighting force, and that, as they are bending all their energies toward helping the nation win a war, they become, under those conditions, combatants, and for that reason some nations might push the use of gas as far as they can, because it is a very effective weapon.

Mr. KELLEY. To what extent did either side succeed in dropping bombs on troops?

Gen. MITCHELL. Well the success was very great in some places, particularly behind the British lines. In October, 1917, the losses every night were very great. I remember that on one night there were over 1,000 killed and wounded from very small airplane attacks. In those days they were small as compared with the attacks we could bring about now on account of the size of the airplanes. On our front I happened to have the biggest air force that was ever brought together under one control, and in our operations our primary object against hostile bombardment organizations that flew at night was to attack the hostile airdromes and destroy them as far as we could, and we succeeded in that very greatly. Not only did we damage their airdromes, but we injured their airplanes to such an extent that their effectiveness was very largely reduced I do not remember that we lost many men in the Argonne from hostile bombardment, but it was due to the fact that we pushed the air attacks against them very greatly; in fact, on one day we dropped 60 tons of bomps, which was the greatest tonnage ever dropped in 24 hours.

Mr. KELLEY. Then if an attack is made by an equally alert and equally strong air service it is practically a fight between the air forces in the air?

Gen. MITCHELL. Yes sir; it is.

Mr. KELLEY. And the land forces go on with their work underneath just the same?

Gen. MITCHELL. Yes, sir. In our operations at St. Mihiel we attacked a silient and operated so as to attack their air forces from behind and cut off their means of communication and separated them from the rest of the air forces, and when we had them in that position we laid our plans so as to bring about the maximum effect from our bombardment. We attacked them to such an extent that it interfered not only with their means of ground communication, but we also smashed a great many of their planes. In the operations in the Argonne we had to operate from a salient in their area, and the Germans were free to attack us on one flank or the other which they always did in the air, so as to make us protect one side or the other and thereby open up our front. I knew they would do that, because I had been at the Battle of Verdun in 1917 with the French when they tried the same tactics exactly. In order to counteract that an attack was initiated every day against their airdromes and centers back of

the line; our ships were in the air before daylight, attacking their airdromes and their centers of concentration, the result being that we kept their ships off the Infantry line to a great extent and pushed the fighting on their side. Of course, that is always an expensive way to fight, because all the people shot down are lost and the rest fall on the enemy's side; you have no salvage and your people are gone when they are wounded and even when they are not wounded your losses are very great, but it keeps them off of your own people. We forced the fighting so that practically all the larger air operations took place 10 or 15 miles inside their territories, and that had the result of keeping their airplanes away from the line.

In the handling of a big force of that kind, everything has to be figured out ahead of time and the whole plan of operations and tactics arranged in great detail. That makes a very intricate tactical system and it has to be thoroughly understood by everybody, otherwise disaster results.

Mr. BYRNES. In addition to attacking the reserves, if an enemy controls the air or secures the mastery of the air there is nothing to prevent them from flying low down and bombarding?

Gen. MITCHELL. That is correct, sir.

Mr. BYRNES. And that is what they did?

Gen. MITCHELL. Very often. At Chateau-Thierry they were all over us all the time. If the Germans had had modern attack and bombardment equipment it might have turned the scale.

Mr. BYRNES. I had a young man attached to me who was shot from an airplane, by a machine gun, and by his description I know that it must be exceedingly demoralizing to the troops.

Gen. MITCHELL. In those days the attack that we made against the ground troops was made by an airplane that had been developed for another purpose. They were unprotected by armor, and they were equipped only with guns that shot through the propellors, etc., and they were not designed specifically for that purpose. Now, we have a regular system of tactics worked out for that. We attack by flights of from five to eight ships flying in formation, all sweeping with their guns at once, and we attack successively, one after another, because if you attack a column on the road, the infantry immediately gets off of that road until the airplanes go away, then they resume the march. We hit in succession.

For instance, if we are going to interrupt the communications along a certain road, we figure out what part of that road is the best part to attack. We always like to get an outfit hemmed in in what we call a defile. We like to stop the head of the column by piling up their horses, or their men, or trucks, or tanks, or anything, doing the same thing at the rear, and then go after them. We have a regular system of a succession of attacks in that respect. Now, here is our attack ship [showing]. That is a picture of the same ship that I showed you a moment ago. There are eight guns in that ship. There are four guns here [indicating], two guns behind and two guns up above.

Mr. BYRNES. That is a development since the war?

Gen. MITCHELL. That is a development since the war. There were none of these during the war. All the engines are armored with a three-eighths inch armor. That ship is being improved all the time.

Mr. KELLEY. It is your idea that while various developments and improvements will be directed more and more against troops, nevertheless, it is not your idea that ever will you attempt to trust the defense of the country, as far as the Army is concerned, to the air alone?

Gen. MITCHELL. Oh, no. You have got to depend on your man-to-man fight. I always tell our people that you have got to get the Infantry to fighting close up, if necessary under the ground or buildings or on the roof or any place else so as to get up man to man.

Mr. KELLEY. You would not undertake to stop a column of troops from the air except to interfere with them so that another column of troops can stop them?

Gen. MITCHELL. That is the idea; yes, sir. We can stop them completely under certain conditions.

Mr. BYRNES. But, nevertheless, the fact is that if an enemy secures the mastery of the air your troops are at a disadvantage?

Gen. MITCHELL. At a tremendous disadvantage; yes, sir. I believe it is decisive.

Mr. BYRNES. They can not see them, in the first place, and, in the second place, the foe has every opportunity to out-maneuver them?

Gen. MITCHELL. Not only that, but these continuous air attacks at night and by day are one of the most demoralizing things that you can think of. It keeps people awake, and they are scared to death. It is very serious. I would like to have you gentlemen see the effect of these bombs.

Mr. KELLEY. The fact is that this development in the air is an additional war activity.

Gen. MITCHELL. To a certain extent. It is a special branch by itself.

Mr. KELLEY. We are not going to get rid of the Cavalry or the

Gen. MITCHELL. You add the Air Service to it.

Mr. KELLEY. And whichever side is supreme in the air will have a tremendous advantage?

Gen. MITCHELL. Yes, sir. I think it will modify the strategy to a great extent. It does not alter it, but it modifies it. With a good air force you have a reserve in your hand which you never had before. We can concentrate, for instance, an air force in the Middle States, and we can use it on the Atlantic coast or on the Pacific coast or the South or North in the same time that it would take an Infantry division to march from here to Baltimore.

Mr. KELLEY. It might possibly displace a part of the heavy artillery?

Gen. MITCHELL. I think for the protection of the coast it will have some effect on that, Gov. Kelley. You must, however, always equip your Infantry with sufficient number of missile-throwing weapons to allow it to complete its mission. Of course when you get into a missile-throwing equipment that will carry a long range you have got to figure on how much you can get out of the money that you spend as compared to airplanes or war vessels, for instance.

Mr. KELLEY. In other words, you want to keep every kind of a weapon that can raise a disturbance ahead of your Infantry or ahead of your troops?

Gen. MITCHELL. That is the idea—whether on land or whether in any other place.

Mr. KELLEY. Now, take up the water if you are ready.

Gen. MITCHELL. There was one thing that I wish to mention with regard to the land.

Mr. KELLEY. All right; go ahead.

Gen. MITCHELL. There has been so much question brought in about bombardments, and about the efficiency of hitting, etc., I would like to say that no one airplane can accomplish a mission, except a reconnaissance machine, when we send them at great altitude alone, which is really by stealth, in the same way that we used to send out strategical patrols—that is, to gather information by stealth rather than by fighting for it. We have to use complete organizations of a great number of airplanes, just as a battalion of infantry has 1,000 men or a battalion of artillery has a dozen guns. Now, we have to aim at hitting the thing from collective bombardment, in accordance with the height which we have got to fly, and the size and the character of the target. For instance, if we had a 3-inch field piece here and wanted to attack a target on the other side of the river, at a range of three or four thousand yards, if we had one piece shooting, we could not do much with that. In the first place, it might get out of order right away. So we get a definite organization of those things and we put four cannons in a battery and we put three batteries in a battalion, and so many battalions in a regiment; that is, we use them together, to get a collective effect on it. Now, we do the same thing in the air and unless you have these units, which we have proved in war to be the best thing, we are not going to get any effect.

For instance, in attacking a target at a height 12,000 or 15,000 feet up in the air we attack with a bombardment wing of three groups. This [indicating] is a group of 100 airplanes. There are three groups in a wing, and they take a certain direction over that objective, as shown in the diagram. They are defended by the pursuit aviation while they are accomplishing it. Each one of these squadrons has one observer in it who directs the squadron on the target. When he throws his bombs all of the rest throw at the same time. Each equadron drops several tons. With this particular airplane here [indicating] we can drop a ton out of that ship at one time. That is a light-weight bombardment ship. Now, each one of these squadrons attacks in the same fashion, and with the wireless telegraph that we have now, if he misses the objective he tells the next fellow how he has missed it and for what reason, and it is carried on that way. Now, if we have to hit the objective, cost what it may, we get right down over it and keep up the attack again and again, for instance, the same as the German bridges on the Marne were attacked.

Mr. WOOD. How close do you get down to them?

Gen. MITCHELL. About 400 meters—1,200 feet. We had no losses, practically, from any antiaircraft fire there at all.

Mr. WOOD. Do you drop your bomb directly over it?

Gen. MITCHELL. Well, we take into consideration the speed, the direction of the wind, and, of course, the height. The sight is set that way, and when it gets on the target you pull. Now, the methods of projecting bombs are being improved every day. You always have three things to consider, your speed, the height, and the direction. The only way to develop it is to actually work all the time—that is, doing this thing practically.

Mr. KELLEY. What would be the practical use of projecting a bomb? What would be the situation where you would want to project a bomb? You can throw it out as you would out of a mortar.

Gen. MITCHELL. You mean projecting one sidewise?

Mr. KELLEY. You used the word "project" in opposition to dropping, I imagine.

Gen. MITCHELL. By dropping a bomb we mean just letting it go, but projecting one, we mean in order to get off to the side.

Mr. KELLEY. That is, like gunfire?

Gen. MITCHELL. That is, like gunfire.

Mr. KELLEY. You might want to do that in order to hit a particular mark some place?

Gen. MITCHELL. Yes, sir; it is where something is so that you want to hit it without passing over it. Heretofore, all attacks before aircraft came were made in the same plane—that is, on the ground or water. You have gotten gunfire from above and down, but still it was projected from the same plane. Now we can attack from above, and we can attack from underneath, and we can attack on the same level against an object that is in the air. Against an object on the ground we can attack from the same level or from up above. Against an object in the water we can attack from above, on the same level, and from under the water.

Mr. WOOD. Suppose this Capitol Building were the object and you were 12,000 feet high, where would your machine be, with reference to the building, when you threw your bomb?

Gen. MITCHELL. About a mile or 2 off.

Mr. WOOD. That far? I thought you said 1,200 feet, with these bridges?

Gen. MITCHELL. I understood you to say 12,000 feet. Now, with this Capitol Building, with the bombardment that we had during the war, this whole place would have been destroyed with that wing attack there.

Mr. WOOD. It would?

Gen. MITCHELL. Yes, sir; even with the light bombs that we had then. That [indicating] was about the biggest bomb that we used in the war—the 200-pound bomb. There were many heavier ones, but they were just coming into general use.

Mr. WOOD. What would one of these do if it exploded?

Gen. MITCHELL. If that came into this part of the Capitol it would wreck this whole place. This bomb [indicating] would have a much greater effect. This bomb would probably blow this whole corner of the building off—the 1,000-pound bomb.

Mr. BYRNES. You would have to drop a lot of those to hit it, at any height?

Gen. MITCHELL. With this collective effect, at 12,000 feet, each one of these squadrons would probably get two or more bombs in it. You are dropping it over the whole area, you see.

Mr. KELLEY. It would depend upon how much interference you had in the air?

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. But assuming that you came over at that height, your statement is that you could drop them with accuracy?

Gen. MITCHELL. Yes, sir; according to that map. In that particular case you have 300 ships attacking, and those 300 ships, we can

make them cover an area of 2 by 2 miles. Some of those are bound to hit.

Mr. BYRNES. I think that is a correct statement. Some of them will.

Mr. KELLEY. Well, if even one would hit, it is only one-third of 1 per cent of the shots.

Gen. MITCHELL. Here is the result of our bombardment of a target of a battleship from an average height of 6,000 feet [indicating]. There are 41 per cent of hits there in the danger zone. Those are actual drops. Col. Kilner will show you, on actual measured hits, where they made upward of 80 per cent at 10,000 feet right along. That is precision bombing. Now, that has to be worked out, and we have to develop it; and because it has not been done in the past is no criterion of what will be done in the future. After 500 years of cannon development you can not make over 5 per cent of hits at 20,000 yards. After 4 years of development in the air we can make very much more.

Mr. KELLEY. That is the case of where the target is stationary and you are not molested?

Gen. MITCHELL. Not entirely, sir. As far as any movement of any target on the ground or water is concerned, it is so little that it practically is negligible where collective bombardment is concerned. That is to say, we go so much faster that there is nothing on the ground or water that can move much more than one-fifth as fast as we do in the air ordinarily.

Mr. KELLEY. It appears that, as far as the economic side of this is concerned, we have got to keep everything in the Army as far as we have ever had and add this to it; so that war is constantly increasing in its expense, as far as the Army goes.

Gen. MITCHELL. I would not say that you had to keep it in the Army. I do not think that you ought to keep it in the Army. The air force is an air force matter. It is not an Army matter, because your air force is not in proportion to your Army in any way.

Mr. KELLEY. What I mean is, as far as the national defense goes, this is an added factor.

Gen. MITCHELL. This is an added factor in national defense, as far as an arm of the service is concerned.

Mr. KELLEY. As far as we have proceeded with the discussion now, we would not be quite safe in disregarding any weapon that we had on land.

Gen. MITCHELL. Oh, no; either on the land or on the sea. You can not do it yet, but you will be able to on the sea before long. We must first play safe and improve and substitute as we go along.

Mr. BYRNES. Except this, that there may be some change in your seacoast batteries.

Gen. MITCHELL. Oh, yes; and also navies. Now, I may say that each nation has, of course, its own military problem to face. Germany has a certain military problem. England has a different military problem. France has a different military problem and we have ours. In the case of the application of aviation over the sea, we will take, for instance, between Germany and England; the widest part of the water between Germany and England—that is—toward the northern

part of the British Isles, is not over 500 miles, whereas the narrowest part is 18 miles.

Mr. KELLEY. That is practically then a land proposition; I mean, as far as the tactics and everything is concerned, and your bases and war difficulties, it was really a land personnel, and you could disregard that little strip of water.

Gen. MITCHELL. You could operate from land airdromes, as distinguished from floating airdromes.

Mr. KELLEY. The naval element did not enter into that to any great extent—the war between England and Germany, in the air.

Gen. MITCHELL. You mean the transportation of airplanes on ships?

Mr. KELLEY. It was a land proposition, and you could use your land machines.

Gen. MITCHELL. Yes, sir; so that Germany sees no necessity for developing an airplane carrier for the attacking of anyone. They can operate against England from land airdromes and they can either operate against shipping in the North Sea from land bases, and England can do the same thing against Germany. However, England can not operate against other countries or on the high seas, except by transporting her airplanes in ships.

Mr. KELLEY. Of course, we are speaking of England just as an illustration.

Gen. MITCHELL. Absolutely.

Mr. KELLEY. Without any thought of any controversy with any country, as long as we simply use it as an illustration.

Gen. MITCHELL. We have to trace why we are developing airplanes in certain ways.

Mr. KELLEY. Just to get an illustration of how you will arrange your services.

Gen. MITCHELL. Yes, sir. Now, the air services all over the world are charged, among other things, with the attacking of shipping. The air service is charged with the attacking of battleships and with the attacking of shipping. Consequently, we have to study how battleships are constructed and how secondary ships, such as destroyers and supply ships and cruisers, etc., are constructed, so that we can properly apply our weapons against them. In the air we always have the power of initiative over anything of slower speed. If you go anywhere where anything has a slower speed than you have, you can always get to it. Consequently, if you can get to the thing, the measure of its destruction is a question of development of armament, and that is all it is. If you can get to the thing, it is a question whether you can develop sufficient armament to destroy it or not. The first thing we find on the water is that we have a superiority of speed of from five to eight times the very fastest ships—surface vessels. The second thing is that they can not conceal themselves under trees or in holes in the ground, or in buildings, or anything of that kind. They can not do it, either in the daytime or in the nighttime.

Now, we work over shipping all the time from our principal school of aviation at Langley Field. We are working over the water a great deal of the time.

The next thing we find is that we have no fear of antiaircraft from the ships themselves; that is, machine-gun fire or cannon fire

on account of our experiences in the war. We will lose something by it, but in war you have got to take your losses, and we know from our experience in the war that we can successfully approach that shipping, either over it or toward it, to a sufficient extent to be able to deliver the fire of our weapons.

Next, we know that the ordinary bombs that we have, that is the small bombs, are sufficient to sink destroyers and unarmored ships, or supply ships of any kind. That is, smash them up or sink them. A battleship without its auxiliary smaller ships is very greatly handicapped. The only question has been heretofore as to the effect that air missles would have on armored ships. That has given us more concern that anything else, because, during the war, as the air service was constituted for work against objects on land, we did not have an opportunity of developing weapons essentially for the attacking of warships; so that certain weapons were adapted from other uses for the attacking of shipping, none of which have been entirely satisfactory. For instance, they tried to use torpedoes from airplanes that had been developed for use on warships and they are not at all satisfactory.

Mr. KELLEY. If you will let me interrupt you, so that we may be sure that our minds are going along the same direction——

Gen. MITCHELL. I hope you will, Governor.

Mr. KELLEY. Sometimes it is helpful if your minds are going along in the same general direction.

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. Perhaps my mind is running ahead a little, but I had judged from what you had said thus far that the development for the Navy, for the fighting over water, would run along parallel lines with the development practically of fighting over land.

Gen. MITCHELL. That is correct.

Mr. KELLEY. So that your testimony will not be directed to the point of the substitution of weapons, but the application of weapons.

Gen. MITCHELL. The application of weapons; yes, sir; which eventually will lead in whole or in part to a substitution.

Mr. KELLEY. And perhaps the extension and the addition of this new valuable weapon in the air?

Gen. MITCHELL. That is correct. There is only one branch of aviation that is a direct auxiliary of armies and navies. We call it observation aviation, which reconnoiters and adjusts cannon fire. It constitutes only about 20 per cent of a total air force. All other branches of aviation are used for offensive purposes. That is, to fight the enemy's aviation. This has to have certain flying characteristics of speed, gun power, etc. If it does not have them your enemy will get you. In applying an air force airdromes or landing fields have to be made to suit the airplane, instead of the airplane being made to suit the airdrome.

Mr. KELLEY. That is to say, you must prepare the carriers' platforms, specially adapted for this sort of weapon?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. As to speed and everything else?

Gen. MITCHELL. Yes, sir; because if you do not have the facilities that the other man has you will be shot out of the air in a moment's time.

Mr. KELLEY. And if we lose our place in the air we would be just as helpless in the sea fighting as if we lost our place in the land fighting?

Gen. MITCHELL. Much more so, because our weapons have much more effect against objects on the surface of the water. They are much more easily found and much more easily hit.

Mr. KELLEY. But still, your chief use of the aircraft on the water parallels very closely the purpose of it on land?

Gen. MITCHELL. It does, to a very great extent.

Mr. KELLEY. You would not expect to destroy ships by bombs?

Gen. MITCHELL. Yes, sir; we do most certainly.

Mr. KELLEY. Well, you have first to destroy the enemy's air force.

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. You have never done that in the land fighting?

Gen. MITCHELL. We have in certain areas for a time, but both forces were so nearly equal that when either side concentrated on a point, they controlled until the other also concentrated.

Mr. KELLEY. All through the war?

Gen. MITCHELL. At the end we were getting the upper hand decidedly.

Mr. KELLEY. A siutation of that kind never did arise when you could direct your attention to the troops below?

Gen. MITCHELL. Oh, yes, sir. We kept track of the troops below all the time, and directed attacks against them more and more as aviation developed.

Mr. KELLEY. Not to any great extent. Occasionally you would drop a bomb on the troops, but in the main your attention was occupied with keeping the enemy airplanes from outmaneuvering and getting advantage of you.

Gen. MITCHELL. The development was this: That the three branches of aviation have worked constantly along their own line. Every day bombardments were made in accordance with that system there [indicating]. The pursuit aviation acted with it and in conjunction with it to keep the enemy away, where they could not hurt them. On account of the air battles we had tremendous losses on both sides.

Mr. KELLEY. But generally the strategy, whether on land or sea, would be the same—to hit a ship whenever you could, just as you hit troops whenever you could on land.

Gen. MITCHELL. That is correct. Of course, our first function in the application of our power against a ship is from the land bases, because we have no carriers in which to place this aviation at this time. Our strategy should be, in case of war, to push our aviation out first, just as far as we could get it. In other words, we would push our airships out and find out where the hostile forces were, and we would follow them just as closely as we could with the airplane carriers when provided, so as to bring the fight into their country, if such a thing were possible.

In the study of the development of the application of air power over the water we are confronted with the necessity of developing special equipment and armament for air purposes. We have great difficulty in doing that under our present system. As things stand we have got to go to seven or eight different organizations to get our special things put through. An attempt is always being made

to adapt a machine or gun or something else that has been developed for work on the ground or water, to work in the air. It is impossible. You must get this branch of the service under air officers who can develop everything with particular reference to the air.

AVIATION OVER WATER.

Mr. KELLEY. Suppose first you pursue the use of the craft on the water, and then you can take up the organization following that, so as to keep the record straight.

Gen. MITCHELL. I have some diagrams here to show the use of aviation over the water.

Now, this is land [indicating] and this is water [indicating]. In the first place, we will find out where the hostile ship is coming from. The best element we have for that purpose to-day is the airships, rigid airships—by this is meant lighter-than-air dirigible of the Zeppelin type.

In case of war with a foreign country we should have sufficient airships on hand to be able to throw these airships clear across to the opposing shore, wherever it may be, sufficient to give each patrol district one ship, just the same as we assign sections of front to a patrol.

Mr. KELLEY. Those are your listening posts?

Gen. MITCHELL. Those are the listening posts, the observation posts. They would report back by radio wherever the hostile air force or water force were. If the opposing force were on the offensive and came within the radius of our operations from the different airdromes that we had, we would concentrate all of our offensive aviation in that direction. For instance, if we had to operate with the air force that we have now on the Atlantic coast, we will say, from Chesapeake Bay to Boston, we would concentrate our offensive aviation somewhere in the northern part of New Jersey. We would keep observation all along the coast with the airplanes.

We could continue that observation about 200 miles offshore if we were properly equipped. Whenever we find where the hostile main force is, there we would concentrate all the aviation force against it and attack it directly. If there were hostile aircraft carriers we would bring an attack against them, because that would make their air force rally for the defense of the carriers and keep them off our coast and interior. If we are successful in the attack we have the power of attacking their naval vessels. If not the hostile air force can fly over our country.

I mentioned that we have bombs which we think are capable of demolishing or putting out of action at least not only all auxiliary ships, but capital ships as well.

With these same bombs, as distinguished from projectiles fired out of cannon, we have a greater per cent of hits over 20,000 yards than have cannon projectiles.

Mr. KELLEY. Now, suppose that you take that through a situation. Suppose you take a hostile fleet coming across the Atlantic, just how would we proceed?

Gen. MITCHELL. Under present conditions with aircraft carriers?

Mr. KELLEY. If both sides were equipped with everything that they ought to have.

Gen. MITCHELL. The airships would find the hostile airplane carriers and main naval force and report it back by radio.

Mr. KELLEY. Well, the water craft, including various sorts of large ships, would follow along behind the aircraft? The aircraft would be out ahead? It would move across the Atlantic in that formation?

Gen. MITCHELL. As the hostile fleets with their aircraft carriers come within the cruising distance of their airplanes, an air battle for control of the air would result between the two pursuit aviations. Shortly after or even during this combat the hostile cruisers and battleships would be attacked by the airplane bombardment squadrons with bombs, torpedoes, and possibly gas. That is the way the British Navy is organized to fight to-day with their aircraft carriers. If the air battle were decisive and control of the air were assured, the navy possessing it would be able to observe everything and the enemy would not. This alone would give it a decisive advantage.

Add to this the power of bombardment aviation which could act without hindrance from the air and it would make an added factor. Do I make myself clear?

Mr. KELLEY. I am not sure that you do, but I think I have in mind the general idea, that you would group around your own ships such aircraft as was necessary for its protection?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. Against the aircraft of the enemy?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. And then you would go out and do as much destruction with the enemy, wherever you could find it, as you could?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. You had reference to shipping. Did you mean commercial shipping?

Gen. MITCHELL. All kinds.

Mr. KELLEY. Particularly the fleet of the enemy?

Gen. MITCHELL. I was speaking particularly of the offensive fleet which comes out to fight.

Mr. BYRNES. Would you, while protecting your own fleet, attempt an offensive against the concentrated air defenses of the enemy?

Gen. MITCHELL. Always take the offensive with an air force whenever you can. This is the first arm of a nation that will be used in a future war between first-class powers.

Mr. BYRNES. That is, assuming you have a sufficient force to guard your own fleet?

Gen. MITCHELL. But remember that aircraft is essentially an offensive instrument. You can not dig a hole in the air and sit down and shoot out of it. You have to take the tactical offensive, even if you are on the strategical defensive.

Mr. WOODS. That being true, suppose your object is to sink the enemy's ship, here is its air force [indicating]. You are fighting against the air force. Who is going to sink the ship? Have you got some organization, while you are engaged with the air force, to be operating on the vessel?

Mr. BYRNES. You have got to master the air first.

Mr. WOODS. Suppose you were going out to-day. Here is the enemy coming over here with a fleet of 15 ships and she has got a sufficient air force to protect her. She has brought them along for the purpose

of protecting her. You are going out for the purpose of sinking those ships.

Gen. MITCHELL. Yes, sir.

Mr. WOODS. How are you going to do it?

Gen. MITCHELL. The first thing is to attack her air force. In other words, attack her aircraft carriers.

Mr. WOODS. Your air force that is attacking their air force, would it be a part of their duties to sink the ship or would there be some other auxiliary air force coming along whose purpose it was to sink the vessels? Just like playing a football game, you get the other fellow's wind while the other fellow takes the football and goes along with it.

Gen. MITCHELL. Exactly so. We apportion the various branches of aviation for that specific purpose. Pursuit attacks the hostile air force, attack aviation shoots up the naval vessels to distract their attention, while bombardment aviation destroys them. We would apportion it 60 per cent pursuit and 20 per cent bombardment and attack each. These would act together or singly according to the especial situation, the bombardment for a direct attack on the ships, the attack aviation for a diversion and for an attack on the light ships; that is, destroyers, etc.

Mr. KELLEY. I presume your air force would meet well in advance of the columns of your airships, as a matter of practical tactics.

Gen. MITCHELL. Yes, sir; as far to the front as possible.

Mr. KELLEY. So that wouldn't it be very difficult, after you had conquered the air, until you could drop anything on the ships?

Gen. MITCHELL. If you can get control of the air, you can attack with great ease on the water.

Mr. KELLEY. Your air force would be so well in advance of the ships that there would be little left for your bombardment group to do until after the air engagement was pretty well established?

Gen. MITCHELL. No, sir. We send them often right along with the other airplanes.

Mr. WOOD. You would have to combat the enemy's airships that were in advance of the fleet and beat them clear off before you could attack?

Gen. MITCHELL. You see, this is a game of coordination of the various branches of aviation, very much the same as it is in the Infantry, Cavalry, and Artillery on the ground. They all act together, but we have to have sufficient pursuit aviation arranged in the manner in which I spoke of, so that you can actually get out and fight and manouver it against the enemy. For instance, you spoke about attacking against a hostile ship. We would force the fighting in the air in this way: We might launch our bombardment units at the same time we sent the pursuit out, and they would converge on separate lines over the hostile shipping, to bring the fight off there, just as we converged it over the important places or the airdromes on land selected for attack. If our bombardment was strong enough so as to make them rally for the defense of their ships, in other words, if they were afraid that they were going to be sunk by them, the air would be cleared immediately over your own shipping, because they would have to concentrate everything they had for their own defense. They could not or they would be beaten in detail. The

minute that you scatter in the air your losses are tremendous. We have to concentrate more in the air probably than any other place. Of course, we take a chance for a big thing with a flight or a single airplane often.

Mr. KELLEY. If I get the idea straight in my mind, if the air forces should in any engagement be as nearly balanced as they were on land during the war, the ships following would come together and end with a contest?

Gen. MITCHELL. Yes, sir; of course. They certainly would, and the fight would be similar to those of the past.

Mr. BYRNES. But your pursuit planes go out and engage the pursuit planes of the enemy?

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. That is the first attack?

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. If you destroy them, then your bombing planes proceed to endeavor to destroy the carriers, first, that are with the fleet of the enemy?

Gen. MITCHELL. Of course, if you destroy the airplanes, you would not have to attack their carriers.

Mr. BYRNES. I mean you destroy their pursuit planes.

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. If you destroy them, what then is to prevent your air force from attacking that fleet?

Gen. MITCHELL. Nothing. That is just what it is for.

Mr. BYRNES. Then, any equipment that the other ships might have in the nature of antiaircraft you regard as nothing?

Gen. MITCHELL. We regard it as of no decisive influence.

Mr. BYRNES. You regard it as of no decisive influence; so that, if you once destroy these pursuit planes, or destroy a considerable percentage of them, you proceed then to attack that fleet?

Gen. MITCHELL. Exactly.

Mr. WOODS. Wouldn't it be good strategy to maneuver so that your pursuit planes would engage the other pursuit planes while your bombing planes might get by and go up and sink the vessels?

Gen. MITCHELL. That is practically what we do. In other words, here is how our bombardment is handled: For instance, you select an objective point. Suppose that we are operating from here, as was the case in the Civil War, and we select the city of Richmond as the objective for destruction. Suppose we have our troops around Washington and that the enemy holds the part on the other side of the Potomac River; we have our airdromes here scattered through Maryland. The minute those bombardment airplanes pass the Potomac River into the hostile territory they are picked up by the observation posts. They make an estimate as to where that bombardment is going to go by noting their direction and how long it will take them to get there. They send their pursuit aviation into the air, having figured how long it will take to get to that objective, what height you are in the air, etc. We also know they are doing that, too. So we have our pursuit aviation advance on convergent lines to get to the point where their pursuit will meet them. Do you see what I mean?

Mr. WOOD. Yes.

Gen. MITCHELL. We maneuver so as to get the sun behind us always, in order to bring a surprise against them just at the moment they are attacking the bombardment. We always gauged those distances in Europe so that we could have our pursuit meet the bombardment at the time that they would get the maximum attack from the hostile pursuit. The minute you become involved in a battle with the hostile pursuit you go 5 or 10 miles right away, away from the object you are protecting, because you have got to get on your enemy and keep after him. Never let him go at all until you destroy him or you have been destroyed yourself, or have expended your ammunition or run out of gas.

We know in what direction our bombardment ships will come back in after the attack on Richmond. The minute the enemy breaks off the fight he rallies. We do the same thing. Our pursuit had a system of rallying in case we were separated, and then we would immediately come back and follow up the bombardment again so as to perfect them again in case of attack. If we were sufficiently strong in the air and had the power, or if the military situation were such that we had to lose a great deal in order to accomplish a certain object, we would handle our aviation over the water in exactly the same way. We would go right after them with the primary object of sinking the hostile ship, according to the judgment of whoever was in supreme authority at the time.

Mr. KELLEY. Now, General, because of the skill which you are developing, and all of that, in dropping bombs, I think possibly there may be some who have gotten the impression that your idea was to trust the defense of the country on the water to the air force.

Gen. MITCHELL. I do not see how they could get that from any of my testimony. I think in the future it will have a very great effect.

Mr. KELLEY. You have not at any time had in mind the substitution of the aircraft, or air weapons—at least, at the present time—for any well-developed weapon on the water or under the water?

Gen. MITCHELL. I think that in the future that will be the case, but we must be sure as we go ahead.

Mr. KELLEY. It might happen?

Gen. MITCHELL. But we have got to prove that as we go along.

Mr. KELLEY. You have not advocated any such policy for Congress to pursue at this time?

Gen. MITCHELL. You mean to eliminate the Navy?

Mr. KELLEY. To eliminate the construction of craft such as we have usually relied upon and substitute therefor aircraft?

Gen. MITCHELL. Oh, you can not do it at this stage of the developmen; but you must realize that aircraft have power, if developed, to destroy shipping.

Mr. KELLEY. Absolutely.

Gen. MITCHELL. They have the power of doing it.

Mr. KELLEY. But your point is that we must not fall behind?

Gen. MITCHELL. If you neglect the air force and other people go ahead, the way England is going ahead, with the development of her aviation, you are going to put yourself at a great disadvantage.

Mr. KELLEY. Then I judge, from what I know of your position, General, that your main concern at the present time is the question of organization and development.

Gen. MITCHELL. It is a question of organization and development. Without organization we can not get development. In our form of government, without a sufficient strong organization in the Government to further the needs of aviation, you will not have any aviation to amount to anything. It will be divided and split up and made the "tail of the dog" everywhere, because it is a new outfit. It interferes with the traditions of the older services, and you can not get the older men to see aviation in the way that it actually is. They can not, from their education and psychological make-up. It is impossible.

Mr. BYRNES. What you do say, though, is that if the Navy ever loses control of the air, that its fleet is no longer an effective fleet? That it is liable to be destroyed by bombing planes flying down and dropping these bombs on them?

Gen. MITCHELL. Yes, sir; that is it.

Mr. BYRNES. I prefaced my remark by saying that if you lose control of the air the enemy can fly at a low altitude and drop bombs, and you say you can drop them with accuracy and that when dropped they will destroy the target—you put the fleet out of business once you lose control of the air?

Gen. MITCHELL. Yes, sir; that is practically it.

Mr. KELLEY. The same thing was true before the Air Service was developed, as it related to what they called scout service. If the Navy lost its scouts, small ships that are out gathering up information and finding out where the enemy is, then the enemy torpedo boats or submarines can approach the big ships and destroy them.

Gen. MITCHELL. Yes, sir; but an air force can furnish the information itself.

Mr. KELLEY. So that it is really the same general proposition after all?

Gen. MITCHELL. No. It is different, Mr. Kelley.

Mr. KELLEY. In one case the large ships carrying the heavy armament might be destroyed by the torpedoes, if they did not have the necessary protection in the way of small craft to guard against the approaching enemy?

Gen. MITCHELL. Yes, sir; but an air force can deprive the enemy of its small ships also.

Mr. KELLEY. Now, in the same way with the new weapon, which is far superior as a scout in every way, if he is left a free field in the air, nothing could stop him? It can possibly drop bombs on top of the ships just as the torpedo boat could send torpedoes into the side of a ship? So that whatever new weapon the genius of military men brings out, we have got to have it in our Navy and our Army? Isn't that the fact about it?

Gen. MITCHELL. There is a good deal to that, except that there is this thing about the air force: It can be applied either over the land or over the water. If you do not have your air force organized so that it can be concentrated at the point where it is most necessary, you undoubtedly will lose out by it. I believe that airplane carriers will supplant battleships first, after that battle cruisers, and that the logical outcome will be airplane carriers protected by some form of destroyer.

Mr. KELLEY. I was very much interested in a little article that I saw somewhere, as to your general ideas about organization, and

as soon as we get through with the use of the ships I will be glad to have you discuss that.

Gen. MITCHELL. Let me amplify this, please. I think that the Navy's mission in national defense is the protection of sea communications. I believe that the air force can control sea communications if properly organized and developed, for the reason that it has the power of offense constantly with it over shipping on the surface of the water, because it has power, in my opinion, of destroying any shipping, and a development of equipment, armament and methods will make it vastly stronger.

Mr. KELLEY. Doesn't it have this danger, that you must take into account that its base, as you go any distance away from home, must be a floating base? The surface craft of some kind which itself might be destroyed, leaving you high and dry in the air a long ways from home?

Gen. MITCHELL. Well, yes and no. If we keep up our train in operations against Europe, we haven't any more than 300 miles of water to cross anywhere by going by way of Canada, Iceland, etc. If we project operations in Asia, we have only 52 miles of water to cross in Bering Straits. All of those operations would be from land airdromes and they might be supplied by airships. Now, remember we have to look ahead on this proposition and its development by all people. To-day naval vessels coming from Europe can not operate on this side of the Atlantic without bases on this side. Airships—dirigibles—can do so and get back to Europe.

Mr. BYRNES. General, have you stated how low these machines would fly over a fleet in order to bomb ships with any accuracy?

Gen. MITCHELL. Now, we go just as low as it is necessary to hit them, Mr. Byrnes.

Mr. BYRNES. But has any test been made to ascertain at what altitude you can, with any accuracy, drop bombs?

Gen. MITCHELL. Yes, sir; we know from a great deal of experience in war and peace. It isn't so much a question of how low we have to go. We can hit them. It is a question of how we arrange for the attack, as I explained before.

Mr. BYRNES. Of course, having in mind that you are going to inflict injury upon the shipping.

Gen. MITCHELL. Let me elaborate that a little bit. If we use the instantaneous fuse with this 1,800-pound bomb, which we will use—and we want you people to see it in an attack on a ship—we can not fly much lower than 2,000 feet without getting blast fragments from it. With delay action fuse we can come down to any altitude, depending on the delay.

Mr. WOOD. You mean it might fly up and hit you if you get closer than that?

Gen. MITCHELL. Yes, sir. The explosion in that thing is something terrific.

Mr. BYRNES. What will be your accuracy at 2,000 feet?

Gen. MITCHELL. Very, very great.

Mr. FRENCH. What distances were you where you shot that target there [indicating]?

Gen. MITCHELL. About 6,000 feet. You will notice that the hits are about 41.8 per cent.

Mr. FRENCH. This represents the dimensions of the ship [indicating]?

Gen. MITCHELL. Yes, sir. Here is the result of the Navy bombing against a small battleship, and they had very little training in bombardment. They made eight hits on the object itself from an altitude of 4,000 feet. On a modern ship 814 feet long, with 60 feet danger space around it, every shot except those shown on the outside would have been effective at that height. Even with the direct hits made, cannon fire at 20,000 yards would not be as accurate and the damage done by cannon would be very much less.

Mr. WOOD. That was 4,000 feet?

Gen. MITCHELL. Yes, sir. We would not attack at that height, though. We would go much lower than that.

Mr. KELLEY. Lower than that?

Gen. MITCHELL. Yes, sir. This is our method of attack [indicating on diagram].

Mr. WOOD. What would that ship be doing to you folks?

Gen. MITCHELL. Firing all of its antiaircraft artillery. Shipping, when it is provided with proper antiaircraft means, will probably form a barrage from ship to ship with cannon and machine guns. This is the way we would attack them [indicating on diagram]: We will come down at low altitudes, equipped with small bombs of various kinds, that is, 25-pound bombs, and with the cannon and machine guns which are shown here [indicating]. We would fly at an altitude of about 100 feet, right into them from all directions and deliver the contents of these weapons. This would put their antiaircraft defense in a very bad plight both from losses and from distracting their attention.

Mr. KELLEY. That is all conditioned, of course, that they will let you get that close with their air forces?

Gen. MITCHELL. Surely.

Mr. BYRNES. That assumes that you have defeated the enemy planes?

Gen. MITCHELL. Yes, sir. You have to have sufficient control of the air to be able to operate. We nearly always had sufficient control of the air in Europe to be able to operate, of course with heavy losses from other aircraft. Losses follow in accordance with the amount of control that we had of the air. For instance, at Chateau-Thierry the losses were terrific. In the Argonne the losses fell greatly. Toward the end we were inflicting losses of almost ten to one on the enemy.

Mr. KELLEY. I do not find that the general's opinion is different from the opinion generally prevailing in the Navy, except possibly he may be a little more sanguine as to the percentage of hits on craft the size of a ship out at sea, where land is far away, so that you can not gauge distances so well. Outside of a few details like that the general opinion in the Navy is that the aircraft is absolutely essential and necessary to the operation of the fleet. That is the general's opinion, and not as a substitute for any ships.

Mr. WOOD. I gathered from somebody that we had here that if they hit a ship it was an accident.

Mr. KELLEY. Yes; there is that difference of opinion.

Gen. MITCHELL. That opinion does not obtain among air officers who have had experience. The fact of the matter is that cannon can

hit very little at ranges of 20,000 yards and over, and their projectiles are not nearly as efficient as air projectiles can be made.

Mr. KELLEY. You did not find that you were in any great disagreement with the officers of the Navy?

Gen. MITCHELL. Not with air officers in the Navy. We believe that aircraft will control the water eventually if we are allowed to expand and to go ahead. If we are not allowed to go ahead and expand in the way that we know we can, we will be kept back while the other nations will go ahead. It is not going to come in a minute, but by degrees.

Mr. KELLEY. Your information is that other far-seeing nations are developing the air?

Gen. MITCHELL. Most decidedly.

Mr. KELLEY. And the United States ought to do the same thing?

Gen. MITCHELL. That is one branch of the national defense that the nations have not cut down to any very great extent since the war. France maintained practically her whole force.

Mr. KELLEY. Now, in England—is their development mostly land development or are they really building these carriers and equipping themselves in quite a considerable way?

Gen. MITCHELL. The principal effort in Great Britain to-day is in developing her air force to protect the sea communications around the British Isles.

Mr. KELLEY. That is because of her ancient traditions?

Gen. MITCHELL. That is her position. She cannot eat unless she protects her communications. It is not a question of tradition; it is common sense.

Mr. KELLEY. That is her position with regard to the continent of Europe?

Gen. MITCHELL. She can not maintain herself unless she does. In other words, if she does not control the air around the British Isles she can not exist, because the air will certainly control the shipping.

Mr. FRENCH. But control of the air in any part of the country depends more upon the distance that the opposing nation is from it than does the control of the sea upon its navy. For instance, if the navy in Europe, of a strong country there, is larger than the Navy of the United States, that nation may control the sea. On the other hand, if our Navy is larger than her navy, we may control the sea; but when you think of distances, we might have an air force that would dominate the air within a radius of 200 miles of our shores, but would be quite ineffectual as against a much smaller air force across the sea in Europe?

Gen. MITCHELL. That is very true.

Mr. FRENCH. Or, on the other side of the sea, in Asia.

Gen. MITCHELL. That is very true; but if you equip yourself with proper means of transporting your air force where they are needed it will give you an instrument of offense that the Navy can not possibly possess, because it will allow them to fly with impunity over hostile countries clear into the interior.

Mr. FRENCH. What I mean especially is that while the Navy is largely governed as to its efficiency by its size and power, the size of another nation's navy and air force is not so limited. That is, it must be immensely greater in order to dominate the air, as against nations quite remote?

Gen. MITCHELL. I would not say it would have to be immensely greater. It has to be effective and have the means to be applied where necessary.

Mr. FRENCH. An air force equal to the air force of Japan would be perfectly effectual against protecting our coast against attacks by Japan. On the other hand, it might be helpless as against making an attack upon Japan?

Gen. MITCHELL. Yes; I see exactly what you mean.

Mr. FRENCH. And the contrary would be true?

Gen. MITCHELL. Yes. It is a question of how you can apply that and how it is apportioned. For instance, take the *L-72* that was designed in Germany—that ship was designed for an attack on New York, and most certainly would have attacked New York. It was almost ready at the signing of the armistice to do it. That ship could come over here and attack New York, and we had absolutely nothing here to stop it.

Mr. KELLEY. During the war I was overseas, and I saw this grand fleet of Great Britain, up north of Edinburgh.

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. It struck me as though it would be a magnificent mark for these German aircraft.

Gen. MITCHELL. A splendid target.

Mr. KELLEY. Why didn't they go in there and sink those ships?

Gen. MITCHELL. Because at that time there was no development of aviation for that purpose. Their airplanes did not have the radius of action as the distance from Germany was about 500 miles. They did not have these weapons that we are beginning to have now.

Mr. KELLEY. This accuracy which has developed later is due to developments of the war?

Gen. MITCHELL. It is the development of armament and development of air forces. The Germans did not have equipment developed or made for the purpose of attacking shipping. They developed airships—dirigibles—so as to reconnoiter over the sea primarily. Next, they found that they could do a good deal with zepplins in bombardment. The first oversea warfare that they used in the beginning of the war, in accordance with their policy, was their aerial and submarine warfare. One of the first missions of the German high seas fleet was to go out into the North Sea and act as an aid to the airships attacking England. It was stated right in black and white in their mission.

Mr. BYRNES. It is possible also that they had airships to defend that region where that Grand Fleet was located.

Mr. KELLEY. Oh, yes; so that it all comes back to the original proposition, that the first fight is in the air.

Mr. BYRNES. That is right.

Gen. MITCHELL. Let me tell you something about the use of aircraft across the sea. After I came to Europe in 1917 London was bombarded in plain daylight by German Gotha airplanes flying in formation. They could not go at a greater speed than 90 miles per hour at an altitude of eight or nine thousand feet. The British were helpless to stop them, because they had no organization for the air defense of London.

Mr. KELLEY. It seems as though the Germans would have preferred to have taken chances on hitting some of these ships that were all in there together rather than dropping bombs on innocent population.

Gen. MITCHELL. They were too far away and did not have the equipment to get there with. Their airplanes would have required a cruising ability of 1,000 miles.

Mr. KELLEY. They could not go up to Scotland? Our fleet was there at that time. I saw them there in May and June, 1918.

Gen. MITCHELL. It was well known where the fleet was. The Germans knew just as well as anybody else, both from their Zeppelin airship reconnoissance and through espionage.

Mr. BYRNES. I was there in October, but not in the early days.

Gen. MITCHELL. Airplanes are now being developed that will go that far and carry a great weight of bombs.

Mr. BYRNES. If they had equipment and could have dropped bombs on London, I am wondering why they did not make a try at the fleet off of Edinburgh, except that it was a greater distance to go up there.

Gen. MITCHELL. That is exactly it. Their airplanes could go only about 250 miles, while 1,000 miles was required to get the fleet.

Mr. KELLEY. There was a line of ships running for 8 miles up there.

Mr. BYRNES. They could have thrown one down there and it would have been hard to miss a ship.

Mr. KELLEY. There was a string 8 miles long there, just a few hundred feet apart.

Gen. MITCHELL. They were outside of the radius of bombardment aviation. In order to bring an attack against the fleet, or anything else, you have to attack it en masse, the way I pointed it out to you on this chart. An individual attack of one single airplane is not going to do much good, because you must fire a number of projectiles to cause a decided effect.

Mr. KELLEY. How about flying boats?

Gen. MITCHELL. They are very inefficient from an air standpoint, because a flying boat can not exist in the face of hostile aircraft. It can not maneuver. It hasn't got speed or ceiling, can not land in water with ice in it without puncturing it. It can not defend itself against pursuit aviation. It is very expensive and its upkeep very high. It has almost as much trouble existing on a rough sea as a land plane. One thing that we most strenuously objected to was the covering of our coasts with flying boats, because the minute the enemy went into them they would puncture that thing like putty, and the money put into them, if regarded from a standpoint of coast defense, would be largely wasted, in my opinion.

Mr. KELLEY. Then it means that the greatest care must be exercised in supplying floating bases?

Gen. MITCHELL. You have got to get the aircraft carriers to apply your air force over the water at great distances from the coast.

Mr. BYRNES. You have either got to have carriers or you have to have that boat.

Gen. MITCHELL. No, sir. You have got to have carriers. The flying boats are of little use in war.

Mr. BYRNES. You probably would have to have carriers, even if you had the boat?

Gen. MITCHELL. You mean the flying boats?

Mr. BYRNES. Yes. This boat that you are talking about. You said that you had a type that made it heavy.

Gen. MITCHELL. Any flying boat as at present constituted is not an efficient war aircraft.

Mr. BYRNES. That is what I am talking about; if you haven't got that, what is the purpose of the boat?

Gen. MITCHELL. The purpose, sir, is to allow it to land on the water, but in doing so you load it up so with weight that you take its necessary flying characteristics away from it.

Mr. BYRNES. That is the purpose you want to serve by having the carriers?

Gen. MITCHELL. We want the carriers to form floating airdromes that can act whether the sea is rough or smooth, that have a great radius of action and that can carry a tactical unit of planes.

Mr. BYRNES. I say, then, if you do not have that boat there, you have got to provide for sufficient carriers to take care of these ships?

Gen. MITCHELL. You have got to provide for carriers, because the flying boat can not defend itself against hostile attack.

Mr. KELLEY. Is there some little difficulty about landing a machine on a small platform in the sea?

Gen. MITCHELL. There is a great deal of difficulty. The airplane carriers must be made to suit the airplane, so as to get the maximum efficiency in the air.

Mr. BYRNES. The general tells you that the plane with the boats attached is at the mercy of the enemy, and as I understand it, at the same time he would say that the small carriers have not been attached that will enable them to land at sea, and so far as the Navy goes, they have to have one or the other.

Gen. MITCHELL. Here is the point about that, Mr. Byrnes. If you have a flying boat which has not the power to maneuver against pursuit aviation, for instance, and is not protected by pursuit aviation, it can not exist; it is destroyed.

Mr. BYRNES. In its place what do you suggest?

Gen. MITCHELL. Having carriers such as I have outlined here.

Mr. BYRNES. You have to have big carriers?

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. And that would mean big ships?

Gen. MITCHELL. Yes, sir. Furthermore, if you attempt to operate in the air without properly arranged air tactical units you will fail in the accomplishment of your object.

The development over the water in England has been something as follows: First they found that they had to have an airplane to adjust the fire of their naval vessels, so they got airplane carriers which would carry the observation airplanes for that purpose. Immediately that had been done they came to the conclusion that unless they had pursuit aviation to fight the enemy aircraft and protect those observation planes they could not exist. So they immediately got pursuit aviation.

Next, they determined that if they did not carry the fight out beyond where their navy was that the fight would occur over them, so they took their fastest existing ships and equipped them with landing platforms. The object of that was to go away out beyond the range of the fleet artillery and fight for the control of the air. There-

fore, the next thing to do was to construct special carriers of great speed and let them go away out ahead of the fleet.

Mr. KELLEY. Is there such a thing as carrying the aircraft on the deck of the battleship?

Gen. MITCHELL. The battleships should carry the observation airplanes for their own use just the same as our tactical divisions on land have to carry their observation airplanes.

Mr. KELLEY. If you take the battle cruiser, which is the last word in speed, and put the right sort of aircraft on the deck of a ship like that, would it be useful?

Gen. MITCHELL. You can not get pursuit ships on, for the reason that you have not sufficient landing deck unless you absolutely make the cruisers carriers, because their decks are littered up with funnels, turrets, and all sorts of things. We should have vessels constructed especially for aircraft. We call 100 airplanes a group, and of those you would have 60 per cent available for duty. You could probably keep 30 all the time in the air in a case of that kind, and your first carrier should be designed to carry a pursuit group.

Mr. KELLEY. How many carriers like the *Leviathan* should this Government have?

Gen. MITCHELL. You have three ships now that you can get right away and transform at once at comparatively small expense—the *Leviathan*, the *Von Steuben*, and the *Agamemnon*.

Mr. KELLEY. Is the *Leviathan* in working condition now?

Gen. MITCHELL. It is laid up at present.

Mr. KELLEY. It has never been reconditioned for a passenger ship?

Gen. MITCHELL. I understand it was offered for sale and no one wanted to buy it. Of course, to transform these ships would only be a makeshift for the time being. What we need are real carriers.

Mr. BYRNES. We are asked for money to recondition it and we did not give it to them; we let it stand.

Mr. KELLEY. I think we have your views in the outline, General, as to the organization of the service.

Gen. MITCHELL. This is the point I want to make about the application of air power over the sea. The application over the sea of air power is a question of providing suitable airdromes from which the airplanes can act. That means airplane carriers that can go far out to sea.

Mr. KELLEY. You do not think it would pay to use the decks of battleships or other fighting craft for that purpose?

Gen. MITCHELL. You can not, for offensive operations, because, in order to get the three characteristics, speed, gun power, and maneuverability, you have to have a longer run on the airdrome than is possible on a battleship.

Mr. KELLEY. Suppose we had the *Leviathan*. Of course she would have to follow along behind your aircraft at some reasonable distance back of it, but she would have to be ahead of the other craft. Do you not think there would be danger of her being torpedoed all the while?

Gen. MITCHELL. Of course, speed is the greatest protection against the danger of being torpedoed; she has about as much speed as any battleship would have, but that ship is not fast enough to be able to act independently.

Mr. KELLEY. You would have to protect the *Leviathan* with destroyers?

Gen. MITCHELL. She would have to go right with the fleet.

Mr. KELLEY. She would be ahead of the fleet?

Gen. MITCHELL. No; she probably could not keep ahead of the fleet; she has not the speed.

Mr. KELLEY. But, as a matter of tactics, your base in the air would be ahead of your ships?

Gen. MITCHELL. It should be; yes, sir.

Mr. KELLEY. That would be a difficult matter. The largest horsepower we used to hear about down here was 40,000 horsepower until we got to the battle cruisers and we ran those out to 180,000 horsepower. How much horsepower do you think of developing?

Gen. MITCHELL. A couple of hundred thousand horsepower or more. If other nations are going to have it we must have it also, and the sooner the better.

Mr. KELLEY. It takes a big ship for a carrier?

Gen. MITCHELL. We want one having more than 1,000-foot landing space if we can get it.

Mr. BYRNES. According to your plan, you must have a big carrier?

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. How many ships could you carry on the *Leviathan*?

Gen. MITCHELL. Twenty-five bombardment planes.

Mr. BYRNES. You think you should have a sufficient number of carriers for pursuit planes?

Gen. MITCHELL. The *Von Steuben* will carry 100 pursuit planes. The *Agamemnon* will carry two squadrons, or 50 attack planes.

Mr. BYRNES. They are about the size of the *Mount Vernon*?

Gen. MITCHELL. The *Von Steuben* is about 30 feet shorter than the *Mount Vernon*.

Mr. KELLEY. I just want it in the record again, General, for fear that it was not in just as premeditatedly as we both want it, that there is not anything that you have said about aircraft to-day which should be taken by anybody to mean that you intend to establish a substitute for surface craft at the present time?

Gen. MITCHELL. You mean surface war craft?

Mr. KELLEY. Yes; at the present time.

Gen. MITCHELL. I will answer that by saying that I think that air power can damage, destroy, or sink any surface craft.

Mr. KELLEY. If it is allowed to sink it?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. But you would not advise this committee or Congress at this time, with all the information that you have about the possibilities of the development of the air and all that, to substitute the air for the water, but simply to add to the aircraft?

Gen. MITCHELL. Most decidedly not. You can not do it. You would simply render our country subject to the attack of other nations who have that advantage.

Mr. KELLEY. I think it is important that your statement should be in the record in that way, because I fear that some Members of Congress rather have the impression that you thought that certain warcraft need not now be constructed, because they were so at the mercy of the air. Now, General, what you are advising is the development of the air and not the abandonment of anything else?

Gen. MITCHELL. Yes, sir. As the Air develops and improves itself, then you can cut out some other things. In so far as the development of sea power is concerned, it has always been a question of the development of armor, armament, and speed. We in the air have the power of speed and we must develop our armament, our radius of action, and means of its application.

Mr. KELLEY. Now, we have a program of construction for the Navy which involves yet a big expenditure for battleships, battle cruisers carrying 16-inch guns. You are not advising the discontinuance of any of those because of any new developments in the air?

Gen. MITCHELL. I consider that a naval matter. You must consider what they can do with the Navy as opposed to an enemy navy at present.

Mr. KELLEY. While it is possible and may be probable that air weapons may more and more come to the defense of the Nation, it has not yet reached that point where you would be willing to advise Congress to discontinue any weapons that we now have and to substitute air as our only defense?

Gen. MITCHELL. I would advocate the proper proportion of money that we have available in this Government among the Army, the Navy, and the Air in accordance with the way that you can get the most out of it.

Mr. KELLEY. What you are cautioning us against is the neglect of development of the air?

Gen. MITCHELL. Yes, sir; decidedly. Our hands are almost tied now in air development.

Mr. KELLEY. You are advising the development of the air?

Gen. MITCHELL. Yes, sir; I say this: That if you take dollar for dollar you can make more out of the air than from any other branch alone as a means of defense of the coasts of this country against any form of attack. But you must proportion and balance each necessary part, remembering that the contest of man to man is the final test.

Mr. BYRNES. Have you information as to what other nations are doing toward building carriers for the purpose of aviation?

Gen. MITCHELL. We know that England is developing her aviation for use over the water from carriers.

Mr. BYRNES. Have you any idea as to how many carriers she now has?

Gen. MITCHELL. It is a matter of common knowledge that she has six carriers—maybe more.

Mr. BYRNES. Does France have any?

Gen. MITCHELL. France has no airplane carriers, because she has not an offensive organization over the water.

Mr. BYRNES. Has Italy any carriers?

Gen. MITCHELL. I think Italy has one or two small carriers that were developed for use during the war over the Adriatic.

Mr. BYRNES. Has Japan any carriers?

Gen. MITCHELL. Japan has projected carriers now, and she is going in for a big air development.

Mr. KELLEY. General, suppose you tell us just what you think ought to be done in the way of organization?

Gen. MITCHELL. In the first place the essential good that a nation gets from aircraft is as a means of military defense, which is 90 per cent; the other 10 per cent may be commercial and for sport.

Mr. KELLEY. Is the other 10 per cent for commercial purposes or for pleasure?

Gen. MITCHELL. Both, sir. Next, there are two uses for an air force where you can gain 400 per cent on your investment: One is for forest patrol, and the other is for mapping your country. Last year our air forest patrol probably saved more in actual money than the whole air appropriation. With the proper triangulation on the ground we can map this country very quickly, helping the Geological Survey and the Coast and Geodetic Survey. The next thing is to develop commercial aviation so that it will pay for itself to such an extent that it will not make it necessary for the Government to spend more money for national defense along the line of development than is absolutely necessary. All of those things mean development in many ways, development of material, development of personnel, development of means for applying this air force whether over the water or over the land. At the present time we have the development of the air force split up among several organizations: The Navy, the Army, the Post Office Department, and now nearly every department of the Government wants to get certain aircraft to use in connection with their activities.

We believe that by unifying that work all under one general direction, making one man under the Government responsible for the needs and development of aviation, that you will do very much better; the money will go very much further, and you will get very much more efficiency and development out of aviation than otherwise.

Mr. KELLEY. You would build up an entirely separate organization from the Army, Navy, or any other service in the air?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. There is a report which has come through that a separate air service is not satisfactory in England. What do you know about that?

Gen. MITCHELL. I know that it is very satisfactory. It is primarily the cause of her air development. I know just where those reports emanate from. It stands to reason that when you place development of a thing under personnel who are decidedly interested in it above everything else, it is better than placing it under those that have some other development as a main issue. Air officers are the only ones who can actually develop an air force.

Mr. KELLEY. The carrier proposition is really the important thing now in the Navy, from your point of view?

Gen. MITCHELL. Yes, sir; it certainly is. Now, another thing about the unification of the air force is the coordination of tactical organization and effort. To-day the Marine Corps has one organization; the Navy has another, and we have a third. Of course, the Army air service of our Government has had more experience than the others, and our organizations are all developed as a result of war.

Here are some photographs showing our pursuit group and bombardment group on the Mexican border. With a unified service we could perfect the system along the line of tactical development and technical development, and the tactical development is far more im-

portant than the technical development, because the technical development must be based on it.

To-day we have two organizations that are supposed to be working along the coast. When Senator Harding's ship came into Chesapeake Bay the Navy was flying over, and we were flying over with no cooperation. The British had the same difficulty in the early part of the war which enabled the Germans to fly over England unhindered. The Navy was supposed to protect the water, and the Army to protect the land. The enemy planes would fly over the water, and the Army would stop there, and the Navy could not do anything. You can not accomplish anything without unification of duty. Furthermore, all your defense against aircraft, whether it be on the ground or in the air, has to be coordinated. In Europe I had under my tactical direction the searchlights and the antiaircraft artillery. Now it is scattered again. The Coast Artillery Corps has the antiaircraft artillery; the Marines are going to have some of it, and the result is that we have no coordination and little development; nor are we going to get any development of weapons if there is no coordination.

Mr. KELLEY. Is there a fundamental distinction between the air force over land and over water?

Gen. MITCHELL. Only so far as observation aviation is concerned. You have to have a special type of airplane to fly from battleships and with infantry divisions. This is about 20 per cent of our aviation, but in so far as the application of your air force is concerned you can apply the same system over the land and water with proper carriers.

Mr. KELLEY. This would necessitate the organization of a new health department, would it not, if you had a unified service?

Gen. MITCHELL. No, sir; we have it already. We have doctors who fly with us in the air. It is a very great mistake to assume that we would have to have a new health department. We have every department right now that would function for the whole force. We have our medical department and our research laboratories. We have personnel training in ordnance work. We have practically every department that applies to us, because we could not operate without them.

Mr. KELLEY. They are assigned to you from the Army?

Gen. MITCHELL. Yes; but they are on duty with us.

Mr. KELLEY. If you had a separate department the Army would not assign these doctors to you. You would have all that overhead; you would have your Medical Corps, your Dental Corps, and your Supply Corps?

Gen. MITCHELL. No, sir; they would come right with us, and the Army would be reduced by that number.

Mr. KELLEY. You already have the personnel?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. All you would have to do if you had a unified service would be to cut yourself off from the other departments?

Gen. MITCHELL. Yes, sir. We have an ordnance section also.

Mr. KELLEY. How about your hospitals?

Gen. MITCHELL. Well, we have post hospitals now; we would assign our seriously sick people to the Army or Navy or civil hospitals

and pay for them. The overhead would be very much lessened; it would be cut down very greatly.

Mr. BYRNES. Let me ask you as to your observers: Taking for granted that even if a man goes up in an airplane, the benefit the fleet would derive from his going up would depend upon his observation power and his ability to place a proper value upon what he had observed?

Gen. MITCHELL. Yes, sir.

Mr. BYRNES. Now, if a man has had no training on the sea at all, would he be as competent as an observer as a naval officer who has had some naval training as well as some training in aviation?

Gen. MITCHELL. I will answer in this way: Each one of our specialized branches in aviation has its special training, just as in the case of the Infantry, the Cavalry, and the Artillery. In the Army we have a special observation school to which observers are sent for training in Army observation. In the same way, if we had a unified air service, the naval observers would be sent to a school for training along that line.

Mr. KELLEY. Where would you get your commissioned officers from—from the Army?

Gen. MITCHELL. To begin with?

Mr. KELLEY. No; permanently.

Gen. MITCHELL. We would get them from the young men of the country that had been trained for the air.

Mr. KELLEY. You would take college graduates?

Gen. MITCHELL. Yes, sir. We would take college graduates with the proper physical attributes and put them through our primary school which we have to-day and then put them through the special schools for attack, bombardment and observation, and then put them through our field officers' school at Langley Field, so that they would have about five years' training before they were thoroughly equipped.

Mr. KELLEY. How many officers are now in the service from the Army?

Gen. MITCHELL. We have authority for 1,540 and we have about 1,050.

Mr. KELLEY. And how many men?

Gen. MITCHELL. We have an authorization of 16,000 and we have about 10,000.

Mr. KELLEY. And about 6,000 in the Navy, making 16,000 in all?

Gen. MITCHELL. Yes, sir; and 500 flying officers in the Navy. We do not consider an officer as an air officer unless he is a flying officer.

Mr. KELLEY. How do your officers run in rank?

Gen. MITCHELL. Our officers are very much junior in rank than anybody else because we have a single list which keeps them down. I have a copy of my hearing before the Army subcommittee which covers that point.

Mr. KELLEY. Of necessity, I suppose, a flying officer must be a young man?

Gen. MITCHELL. No, sir. Not any more than in any other place.

Mr. KELLEY. I had an idea that was a young man's job up in the air?

Gen. MITCHELL. You must have a regular hierarchy of progress. Your superior officers must be older and your junior officers younger.

Mr. BYRNES. But for the fighting planes it is a young man's job?

Gen. MITCHELL. Well, you do not have a general in the Army carrying a rifle on his shoulder with the Infantry soldier.

Mr. BYRNES. But your flyer in the pursuit plane is generally a youngster?

Gen. MITCHELL. It depends on what you call young. The best men we had in Europe were between 25 and 30 years of age.

Mr. KELLEY. What are you going to do with your officers when they are advanced in age?

Gen. MITCHELL. Keep them on the work they are on now and develop them for higher command. Fill up lower ranks with reserve officers in the proportion of five reserves to one permanent.

Mr. KELLEY. Keep them on the ground?

Gen. MITCHELL. No, sir. Every one of our officers has to be an air officer or he will not know his business.

Mr. KELLEY. What if they are 50 years old?

Gen. MITCHELL. We have them at 50; we have them flying at 49. Now, this is what we want to do, Governor, roughly: To develop a corps of flying officers who will furnish the overhead for the expanded flying corps and keep only one-fifth of the flying force under the colors, all the rest being in reserve.

Mr. KELLEY. Have you ever worked out a full plan?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. Have you ever had it drawn in the form of legislation?

Gen. MITCHELL. Yes, sir.

Mr. KELLEY. Did anybody ever introduce it ?

Gen. MITCHELL. Yes, sir.

Mr. KELEY. Who?

Gen. MITCHELL. Senator New last year introduced a bill in the Senate; Mr. Kahn of the Military Affairs Committee introduced a bill in the House; Mr. Curry of California introduced another House bill along that line. A good many bills were introduced.

Mr. FRENCH. Do you have in mind an organization that would be apart from the Army?

Gen. MITCHELL. Yes sir. This year you have set aside over $100,000,000 for aviation. It is roughly as follows:

(a) Under Army appropriations we find the following:

Air Service—		
Maintenance and operation		$33,000,000
This appropriation is to be expended as follows:		
Experimental and research work	$5,250,000	
Production and purchase of new airplanes and equipment	6,000,000	
Claims	150,000	
For establishment of buildings and improvements at stations	245,000	
For purchase of Selfridge Field	190,000	
For aviation increase to officers of Air Service	1,445,376	
For aviation increase to enlisted men of Air Service	192,726	
Military surveys and maps	100,000	
Bureau of Steam Engineering radio shore stations		20,000
Increase for aviation Signal Corps, 1918 (closing up old contracts and claims.)		24,465,187

(a) Under Army appropriations—Continued.			
Air Service—Continued.			
This appropriation is to be extended as follows—Con.			
For pay allowance, etc., of the Army—			
Air Service			$25,360,000
Estimated on 1,540 officers, at $4,000	$6,160,000		
16,000 enlisted men, at $1,200	19,200,000		
Proportionate part of appropriation for the subsistence of the Army based on 16,000 enlisted men in relation to 280,000. The proportionate part of $32,000,000			1,830,000
(b) Naval aviation:			
Procurement, production, operation, and maintenance			20,000,000
This appropriation to be expended as follows:			
Necessary aircraft	$3,883,400		
Necessary equipment	300,000		
To continue construction of 1 airship (authorized)	1,500,000		
New construction at stations	4,962,000		
New equipment for training	100,000		
Maintenance of plants and overhauling	6,044,000		
Experiments and development	2,935,000		
Pay of classified force	275,000		
Aberdeen Proving Ground—			
For construction of 1 steel hangar to accommodate 1 United States Navy *C-2* Air-ship	150,000		
Expenses of investigation committee on establishment of aviation bases at Sand Point, and Port Angeles, Wash	50,000		
Pay of Navy personnel with allowances, etc			8,000,000
Estimated on 500 officers, at $4,000	2,000,000		
Estimated on 5,000 enlisted men, at $1,200	6,000,000		
(c) Post Office:			
To purchase airplanes and maintain aerial mail service			1,250,000
Alaska mail route (subject to disposal of Postmaster General)			255,000
To establish new aerial mail routes at discretion of Postmaster General			1,250,000
(d) Fortifications for seacoast defenses—installation of searchlights and replacements, including those for antiaircraft defenses			566,250
Air Service station—Hawaii			1,300,000
Air Service station—Panama			239,100
Air Service station—insular possessions			302,046
(e) Forest patrol:			
Fighting and preventing forest fires			50,000
Maintenance of air patrol			
(f) Miscellaneous:			
National Advisory Committee for Aeronautics			200,000
Bureau of Standards—for investigation of standardization of methods and instruments employed in radio communication			30,000
To develop methods of testing and standardizing motors, tools, and instruments in response to the requirements of aeronautics			15,000
Officers to take aeronautical engineering at colleges and universities and for textbooks necessary therefor			Unexpended.
Government Printing Office			50,000
War Department			250,000
Navy Department			250,000
(g) General Army appropriation:			
Proportionate part of all appropriations for regular supplies of $28,000,000 based on 16,000 enlisted men as compared with 280,000 for the whole Army			1,600,000
Incidental expenses based on same proportion			357,000

(g) General Army appropriation—Continued.	
For development, manufacture, and purchase of airplane bombs	$1,000,000
For development, test, manufacture, and purchase of sighting devices for bombs	
For small-arms target practice	28,600
Total	121,168,183

What are we getting out of it now? If we had that same amount lumped under one force, we could use about $45,000,000, or the cost of one battleship, per year in the building of airplanes for our national defense, and after three years of that expenditure you would give us a dominant air force in this country for just what you are spending now.

I wish to thank you very much for the privilege of appearing before your committee.